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(54) TICKET ISSUANCE UTILIZATION SYSTEM

(57) An object is to provide a system for issuing and utilizing a ticket with which a passenger, using an IC card, can purchase a ticket and pass through a ticket gate, the structure being a non-contact terminal memories the non-contact signal transmitted from a ticket-selling machine and involving the permitted-section information corresponding to the section the passenger is aboard the train, and exchanges the permitted section information between the non-contact terminal and the ticket gate.

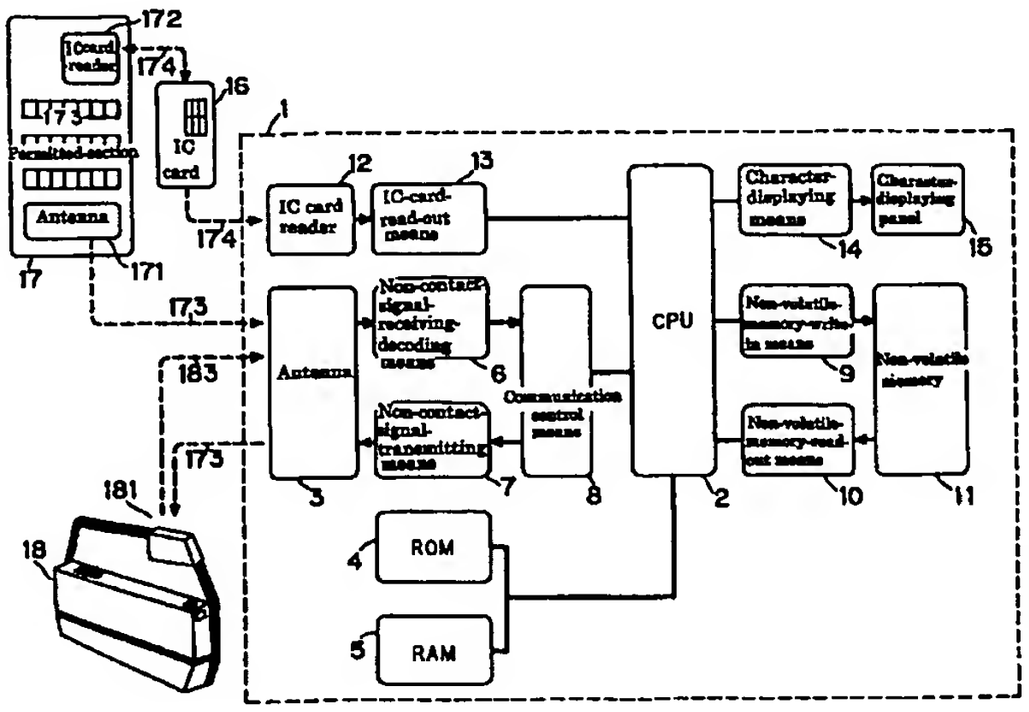

FIG.1

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Description

FIELD OF INVENTION

The present invention relates to a system for issuing and utilizing tickets that can treat information on ticket-purchasing by utilizing IC cards and non-contact terminals, without needs of any contacting. The non-contact terminal hereunder called for convenience in this specification is a kind of computer that gives information to or receives information from the relating outside apparatus by way of electromagnetic waves.

BACKGROUND TECHNOLOGY

In the past, if a passenger wants to utilize a train or such, he must first purchase a ticket (including a commutation ticket), which has a record of the purchasing information, with cash or a prepaid card from a ticket-selling machine or from a station employee, and thereafter insert the ticket into the slot of the ticket gate.

DISCLOSURE OF INVENTION

The present invention aims to provide a system for issuing and utilizing tickets, which makes it possible for a passenger to obtain the ticket, confirming the money amount information and without any contacting, and to pass the ticket gate without any contacting, by utilizing an IC card with description of the amount of money and a non-contact terminal which can transmit and/or receive information on the permitted section (the section permitted for his being aboard) without contacting.

A system for issuing and utilizing a ticket for attaining the above object comprises:

a non-contact terminal having;
an antenna to transmit and/or receive a non-contact signal, a non-contact-signal-receiving-decoding means to read out the information involved in the received non-contact signal, a communication control means to transfer the decoded information to the CPU, a non-volatile memory to store the information, a non-volatile-memory-write-in means and a non-volatile-memory-read-out means to write information in and to read information from the non-volatile memory, a non-contact-signal-transmitting means to transform the information to the non-contact-signal, an IC-card-reader and IC-card-reading means to read the information stored in the IC card, a character-displaying panel and character- displaying means to display the information in a form to be recognized from the outside, and a CPU to control said each means;
a ticket-selling machine having; an IC card reader to read out the information in the IC card, and an antenna to transmit the non-contact signal; and
a ticket gate:

wherein;

said non-contact terminal, when the IC card is inserted into the IC card reader, reads out the information stored in the IC card, and displays it on the character-displaying panel,
the ticket-selling machine, reads out, when a ticket is purchased, the money amount information stored in the IC card by the IC card reader, and transmit the non-contact signal involving the permitted-section information corresponding to the section, over which the passenger is aboard the train, and, on the other hand, receives the non-contact signal involving said permitted-section information, and writes into the non-volatile memory the permitted-section information which is decoded and transferred through the non-contact-signal-receiving-decoding means, the communication control means, and the non-volatile-memory-write-in means which are controlled by the CPU, and
when the passenger passes through the ticket gate, said CPU, which is a part of said non-contact terminal, controls, responding to the on-board-section confirming information which was transmitted from the ticket gate and decoded and transferred at the non-contact-signal-receiving-decoding means and communication-controlling means, said non-volatile-memory-read-out means, to read out the permitted-section information stored in said non-volatile memory, and transmits the non-contact signal involving the permitted-section information via the communication control means and the non-contact-signal transmitting means.

The non-contact-terminal in the system for issuing and utilizing ticket of the present invention has also a function of IC card reader of contact type. When the IC card with description of the amount of money is inserted to the IC card reader of the non-contact terminal, the money amount information is displayed on the character display panel, and the amount of money memorized in the IC card can be confirmed.

When a user inserts the IC card into a ticket-selling machine and selects the section he wishes to be abroad, the non-contact-terminal receives the non-contact-signal involving the permitted-section information which is transmitted from the ticket-selling machine and writes and memorizes the permitted-section information into the non-volatile memory incorporated in the non-contact-terminal.

Furthermore, this non-contact-terminal receives the non-contact-signal involving the permitted-section information which is transmitted from the ticket gate, reads the permitted-section information through the non-volatile memory and transmits the non-contact signal making the permitted-secti n information involved to the ticket gate.

Also, by providing the non-contact terminal with a button for the permitted-section-information-transmit-

ting, the terminal reads, by the button pressing, the permitted-section information from the non-volatile memory, makes it involved in the non-contact signal, and transmits to the ticket gate, without any necessity of transmitting the non-contact signal involving the permitted-section confirming information from the ticket-gate outside. By this, the ticket gate confirms the permitted-section information to allow the passenger to enter therethrough.

On the other hand, if the passenger, when going out through the ticket gate, pushes the permitted-section-information-transmitting-button, the non-contact terminal, likewise as at the entrance, reads out the permitted-section information from the non-volatile memory, and makes it involved in the non-contact signal to transmit to the ticket gate outside. The ticket gate confirms the permitted-section information, and, if it is within the permitted-section, transmits the non-contact signal involving the section-termination information to the non-contact terminal, and allow him to go out through the ticket gate. The non-contact terminal receives the section-termination information transmitted from the ticket gate, to make it impossible for the permitted-section information to be utilized again, to prevent the illegal utilization of the permitted section-information.

While said permitted-section-information-transmitting-button is used, in the way, to transmit the permitted-section information to the ticket gate, it is further used, when the permitted-section-information-transmitting-button of the non-contact terminal is pushed at a place other than the ticket gate, the non-contact terminal is, by adding a function to transform the permitted-section information to characters and to display on the character-displaying-panel, able to make the passenger easily confirm the permitted-section information.

Instead in the IC card, it is possible to form a structure to store the money amount information in the non-volatile memory of the non-contact terminal which transmits the money amount information to the ticket-selling machine. The ticket-selling machine, not only transmits back to the non-contact terminal the permitted-section information corresponding to the section the passenger selected, but also transmits to the non-contact terminal further money amount information which is obtained by subtracting the fair of the section the passenger was aboard from the money amount information sent by the non-contact terminal.

Further, the non-contact terminal is provided with a permitted-section-information-transmitting-button and a transmitting-button-read-out means, and, if the permitted section information is read out by pushing down the permitted-section-information-transmitting-button via said transmitting-button-read-out means, the non-contact terminal, reads out, without necessitating the transmission of the non-contact signal involving the permitted-section-confirming-information from the outside ticket-gate, the permitted-section-information from the non-volatile memory via the non-volatile-memory-read out means, and sends the permitted section information which is made to be involved in the non-contact signal via the non-contact-signal-transmitting part to the outer ticket gate.

The non-contact-terminal has further such a structure that, if the permitted-section-information transmitting button is pushed down by way of the transmitting-button-read-out means, it transforms the permitted section information to characters to display them on the character-displaying panel.

According to the above described structure, the passengers, by utilizing IC cards with money amounts written-in and the non-contact-terminals which can transmit and receive the permitted-section information without contacting, are able, at any time, to confirm the current money amount, obtain the desired permitted-section information without contacting, and pass through the ticket-gate without contacting.

BRIEF DESCRIPTION OF DRAWINGS

Fig.1 is a block diagram of an embodiment of a ticket issuing and utilizing system according to the present invention.

Fig.2 is a block diagram of a second embodiment of a ticket issuing and utilizing system according to the present invention.

Fig.3 is a block diagram of a third embodiment of a ticket issuing and utilizing system according to the present invention.

BEST CONFIGURATION TO EMBODY INVENTION

In the following, configurations of the ticket issuing and utilizing system according to the present invention are explained in detail, referring to the drawings.

(Embodiment 1)

Fig.1 is a block diagram of a non-contact terminal used for a first embodiment of the present invention.

With Fig.1, the inside structure and the function of a non-contact terminal 1 is explained. The non-contact terminal 1 comprises; a ROM 4 to store the control program, a RAM 5 for storing various data, a CPU 2 to perform various controls based on the various programs in ROM 4, an antenna 3 to receive the non-contact signal transmitted from a ticket-selling machine 17 and a ticket gate 18, a non-contact-signal-receiving-decoding means 6 to decode the non-contact signal and extract the permitted-section information 173 transmitted from the ticket-selling machine 17 or section confirmation information 183 from the ticket gate 18, a communication control means 8 to transfer the decoded information to CPU 2, a non-volatile-memory-write-in means 9 to write the permitted-section information 173 into the non-volatile memory 11, a non-volatile-memory-read-out means 10 to read out the written-in permission-information from the non-volatile memory 11, a non-contact-signal-transmitting means 7 to transmit the non-contact

signal involving the permitted section information 173 to the ticket gate 18, an IC card reader 12, an IC-card-read-out means 13 to receive the money amount information 174 via IC card reader 12 from an IC card 16, and a character-displaying means 14 to transform the money amount information 174 to the character to display on a character-displaying panel 15.

In the following, explanation is made of the giving and receiving of information between the non-contact terminal, the ticket-selling machine and the ticket gate, when a passenger utilizing the non-contact terminal of the above described structure, purchases the ticket and passes the ticket gate.

When a passenger purchases a ticket, he inserts the IC card into IC card reader 12 of the ticket-selling machine and selects the section he wishes to be aboard. Then, the non-contact signal involving the permitted-section information 173 corresponding to the selected section is transferred from the ticket-selling machine to the non-contact-terminal and is written into the non-volatile memory. At this time, by inserting the IC card into the IC card reader of the non-contact terminal, the balance stored in the IC card is certified by the character panel of the non-contact terminal.

On the other hand, if a passenger passes a ticket gate, the permitted-section information 173, which has been written in the non-volatile memory of the non-contact terminal from the ticket-selling machine, is read out from the non-volatile memory, included in the non-contact signal, and transmitted to the ticket gate, which can thus confirm the permitted-section information 173 of the passenger.

Thus, the non-contact terminal gives and receives information without any contacting and the information is written into or read out from the non-volatile memory. In the non-contact terminal of the present embodiment, the writing of the permitted-section information 173 which has been involved in the non-contact signal transmitted from the antenna 171 of the ticket-selling machine 17 into the non-volatile memory 11 is carried out as follows.

The non-contact signal involving the permitted-section information 173 corresponding to the section which the passenger selected to be aboard over is transmitted from the antenna 171 of the ticket-selling machine to the non-contact terminal. The non-contact signal received by the antenna 3 is transferred to the CPU 2 via the non-contact-signal-receiving-decoding means 6 and the communication control means 8. The CPU 2 takes out the permitted-section information 173 from the transferred information, and controls so as to write the permission information into the non-volatile memory 11 by the non-volatile-memory-write-in means 9.

On the other hand, when the passenger passes through the ticket-gate, the permitted-section confirmation information 183 which has been involved in the non-contact signal transmitted from the antenna 181 of the ticket gate 18 is decoded and the non-contact signal involving the permitted-section information 173 stored in the non-volatile memory 11 is transmitted to the outer ticket gate.

The non-contact signal received by the antenna 3 is transferred to the CPU 2 through the non-contact-signal-receiving-decoding means 6 and the communication control means 8. The CPU 2, likewise as described above, takes out the being-aboard-section-confirmation information 183 from the non-contact signal. Further, the CPU 2 reads out, by the read-out means 10, the permitted-section information 173 written in the non-volatile memory as a result of the above described process. The permitted-section information 173 read out from the non-volatile memory is transformed to the non-contact signal involving the permitted-section information 173 by the communication control means 8 controlled by the CPU and the non-contact-signal-transmitting means 7, and is transmitted to the ticket gate 18 through the antenna 3.

Further, the non-contact terminal of the present embodiment is controlled by the CPU 2 so as to read out the money amount information 174 from the IC card 16 by the IC-card-read-out means 13 via the IC card reader 12, and, transforming the money amount information 174 to the characters, displays on the character-displaying panel 15 via the character-displaying means 14.

(Embodiment 2)

Fig.2 shows a second embodiment based on the present invention. The present non-contact terminal 1 is of such a structure that, being provided with a permitted-section-information-transmitting button 21 and a transmitting-button-read-out means 22, when said permitted-section-information-transmitting button 21 pushed down is read out via said transmitting-button reading out means 22, the permitted-section information read out from said non-volatile memory 11 via said non-volatile-memory-read-out means 10 can be made involved in the non-contact signal and be transmitted through said non-contact-signal-transmitting means 7, and the permitted section information is transformed to the character to be displayed on the character-displaying panel 15 via the character-displaying means 14. Further, it has a structure that it decodes the being-aboard-section-termination information 184 which is involved in the non-contact signal transmitted from the antenna 181 of the ticket gate 18 to make the repeated use of the permitted section information stored in the non-volatile memory 11 impossible. The structure of the other parts is the same as in Embodiment 1.

(Embodiment 3)

Fig.3 shows a third embodiment based on the present invention. The non-contact terminal 1 in the present embodiment is provided with, instead of the IC card reader placed in the non-contact terminal in the above Embodiment 1, a means to confirm the memory

stored in the non-volatile memory, and, of the structure of the other part is the same as in the non-contact terminal described in Embodiment 1. The memory-confirming means consists of a non-volatile-memory-confirming switch 19 and a memory-confirming-switch-detecting means 20. When a user pushes the non-volatile-memory-confirming switch 19, the memory-confirming-switch-detecting means 20 detects the pushing of the switch 19 to transfer to the CPU 2. The CPU 2 reads out the contents stored in the non-volatile memory 11, to transform to the character information to transfer to the character-displaying means. Thus, the contents stored in the non-volatile memory of the non-contact terminal is displayed on the character-displaying panel 15.

Also, the money amount information 174 read out from said non-volatile memory 11 by the non-volatile-memory-read-out means 10 is made involved in the non-contact signal, and is transmitted to the ticket-selling machine via said non-contact-signal-transmitting means 7. The ticket-selling machine 17 transmit to the non-contact terminal the new-money-amount-information which is obtained by subtracting the fair or the expense corresponding to the section the user selected from the money amount information gained from the non-contact terminal as well as the permitted-section information.

The new money amount information is, along with the permitted section information, by the similar means as in the above Embodiment 1, written into the non-volatile memory.

In the above described embodiments, the money amount information 174 is stored in the IC cards, and, when a ticket is purchased the IC card and the non-contact terminal are used together. On the contrary, in the non-contact terminal shown in Fig.3 not only the permitted-section information 173 but also the money amount information are stored in the non-volatile memory 11,and the use of the IC card is not made.

As explained above, with the IC card issuing/utilizing system of the present invention the passenger can obtain desired permitted-section information 173 without contacting and pass through the ticket gate without contacting, by utilizing the IC card 16 with money amount written in and the non-contact terminal 1 which can transmit and receive the permitted-section information 173 without contacting. Further, he can, by inserting the IC card into the IC card reader of the non-contact terminal, confirm the current money amount. Also, by writing the money amount information 174 into the non-volatile memory in the non-contact terminal, the money amount and the permitted-section information 173 can be transferred without the use of an IC card but of the non-contact terminal only.

Furthermore, the ticket issuing/utilizing system according to the present information, with which the money amount written in the IC card can be used freely by the user, can have the similar advantages when used, instead of the permitted-section information for the use in the railroading, for the entrance permission information of an institution.

POSSIBLE UTILITY IN INDUSRY

The system of issuing and utilizing a ticket according to the present invention, by utilizing the non-contact terminal with the above described structure to transmit and receive the permitted section information between the ticket-selling machine and the ticket gate, makes the purchase and issue of tickets and passing through of a ticket gate without contacting possible.

Table of Marks in Drawings

1	Non-contact terminal
2	CPU
3	Antenna
4	ROM
5	RAM
6	Non-contact-signal-receiving-decoding means
7	Non-contact-signal-transmitting means
8	Communication control means
9	Non-volatile-memory-write-in means
10	Non-volatile-memory-read-out means
11	Non-volatile memory
12	IC card reader
13	IC-card-read-out means
14	Character-displaying means
15	Character-displaying panel
16	IC card
17	Ticket-selling machine
18	Ticket gate
19	Non-volatile-memory-confirming switch
20	Memory-confirming-switch-detecting means
21	Permitted-section-information-transmitting button
22	Transmission-button-read-out means
171	Antenna
173	Permitted-section information
174	Money amount information
181	Ticket gate antenna
183	Being-aboard-section-confirmation information
184	Being-aboard-section-termination information

Claims

1. A system for issuing and utilizing a ticket comprising:

   a non-contact terminal having;
   an antenna to transmit and/or receive a non-contact signal, a non-contact-signal-receiving-decoding means to read out the information involved in the received non-contact signal, a communication control means to transfer the decoded information to the CPU, a non-volatile memory to store the information, a non-volatile-memory-write-in means and a non-volatile-memory-read-out means to write information in

and to read information from the non-volatile memory, a non-contact-signal-transmitting means to transform the information to the non-contact-signal, an IC-card-reader and IC-card reading means to read the information stored in the IC card, a character-displaying panel and character-displaying means to display the information in a form to be recognized from the outside, and a CPU to control said each means;
a ticket-selling machine having; an IC card reader to read out the information in the IC card, and an antenna to transmit the non-contact signal; and
a ticket gate:

wherein;

said non-contact terminal, when the IC card is inserted into the IC card reader, reads out the information stored in the IC card, and displays it on the character-displaying panel,
the ticket-selling machine, reads out, when a ticket is purchased, the money amount information stored in the IC card by the IC card reader, and transmit the non-contact signal involving the permitted-section information corresponding to the section, over which the passenger is aboard the train, and, on the other hand, receives the non-contact signal involving said permitted-section information, and writes into the non-volatile memory the permitted-section information which is decoded and transferred through the non-contact-signal-receiving-decoding means, the communication control means, and the non-volatile-memory-write-in means which are controlled by the CPU, and
when the passenger passes through the ticket gate, said CPU, which is a part of said non-contact terminal, controls, responding to the on-board-section confirming information which was transmitted from the ticket gate and decoded and transferred at the non-contact-signal-receiving-decoding means and communication-controlling means, said non-volatile-memory-read-out means, to read out the permitted-section information stored in said non-volatile memory, and transmits the non-contact signal involving the permitted-section information via the communication control means and the non-contact-signal transmitting means.

2. A system for issuing and utilizing a ticket as described in Claim 1, wherein said non-contact terminal is further provided with a permitted-section-information-transmitting-button, and, if the button is pushed, the non-contact terminal reads out the permitted section information only from the non-volatile memory to transmit to the ticket gat .

3. A system for issuing and utilizing a ticket as described in Claim 2, wherein said non-contact terminal, when a passenger goes out from a station through the ticket gate, transmits the permitted-section information to the ticket gate and transmits a non-contact signal involving the being-aboard section termination information to make the gate to allow the passenger pass through the gate, and, along with it, receives the non-contact signal involving the being-aboard-section-termination information transmitted from the ticket gate to make the repeated use of the permitted section information impossible.

4. A system for issuing and utilizing a ticket as described in Claim 2 or Claim 3, wherein the non-contact terminal, by the pushing of the permitted-section-information-transmitting button, transforms the permitted section information to the character to display it on a character displaying panel.

5. A system for issuing and utilizing a ticket characterized in that the system comprises:

a non-contact terminal having;
an antenna to transmit and/or receive a non-contact signal, a non-contact-signal-receiving-decoding means to read out the information involved in the received non-contact signal, a communication control means to transfer the decoded information to the CPU, a non-volatile memory to store the information, a non-volatile-memory-write-in means and a non-volatile-memory-read-out means to write information in and to read information from the non-volatile memory, a non-contact-signal-transmitting means to transform the information to the non-contact-signal, an IC-card-reader and IC-card reading means to read the information stored in the IC card, a character- displaying panel and character-displaying means to display the information in a form to be recognized from the outside, and a CPU to control said each means;
a ticket-selling machine having; an IC card reader to read out the information in the IC card, and an antenna to transmit the non-contact signal; and
a ticket gate:

wherein;

when a ticket is purchased, the money amount information stored in the non-volatile memory of the non-contact terminal is transmitted by the control of the CPU to the ticket-selling machine via the non-volatile-memory-read-out means and the communication control means, and, thereafter, the ticket-selling machine transmits a non-contact signal involving the

permitted section information corresponding to the section the passenger was aboard the train and the non-contact signal involving the new money-amount information obtained by subtracting the expense necessary for the passenger from the money amount information transmitted from said non-contact terminal, and

the non-contact terminal writes into the non-volatile memory the permitted section information and the new money amount information which were obtained by decoding and transferring of such non-contact signal by a non-contact signal receiving means, communication control means and the non-volatile-memory-write-in means, and

when a passenger passes through the ticket gate said CPU in said non-contact terminal, responding to the being-aboard-seclion-confirmation information which was transmitted from the ticket gate and decoded and transferred by the non-contact signal receiving means and the communication control means, controls said non-volatile-memory-read-out means to read out the permitted section information from said non-volatile memory, and transmits the non-contact signal involving the permitted section information via the communication control means and the non-contact-signal-transmitting means.

6. A system for issuing and utilizing a ticket described in Claim 5, wherein said non-contact terminal is provided with a non-volatile-memory-confirming switch and a memory-confirming-switch-detecting means, and, when said non-volatile-memory-confirming switch is pushed, the memory-confirming-switch-detecting means controls the CPU to read out by the non- volatile-memory-read-out means the money amount written by the non-volatile memory, to have the money amount information displayed on the character displaying panel.

FIG.1

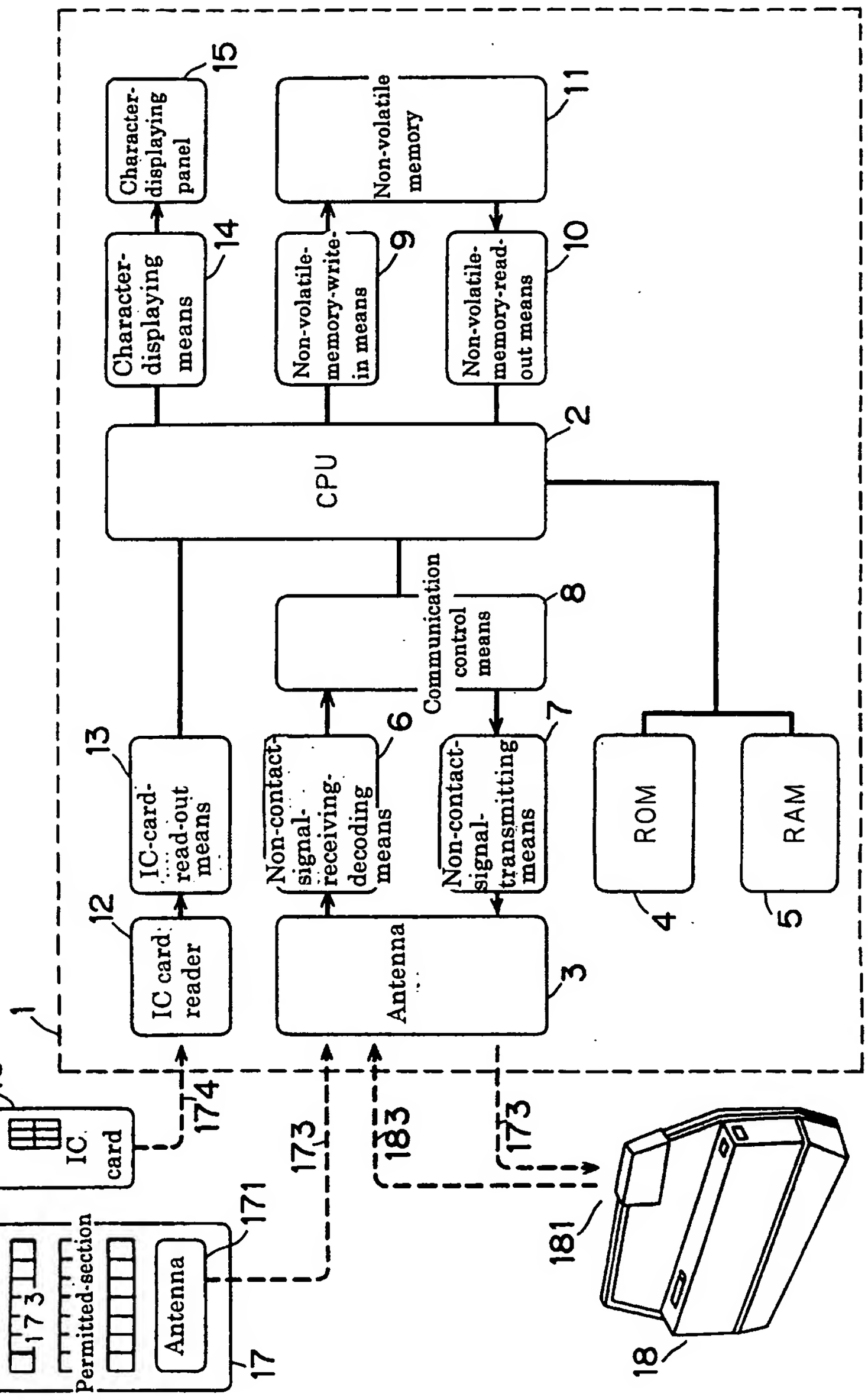

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
CPU
Antenna
ROM
RAM
IC card reader
IC-card-read-out means
Non-contact-signal-receiving-decoding means
Non-contact-signal-transmitting means
Communication control means
Non-volatile-memory-write-in means
Non-volatile-memory-read-out means
Non-volatile memory
Character-displaying panel
Character-displaying means
IC card
ICcard reader
Permitted-section
Antenna
172
174
173
171
183
181

FIG.2

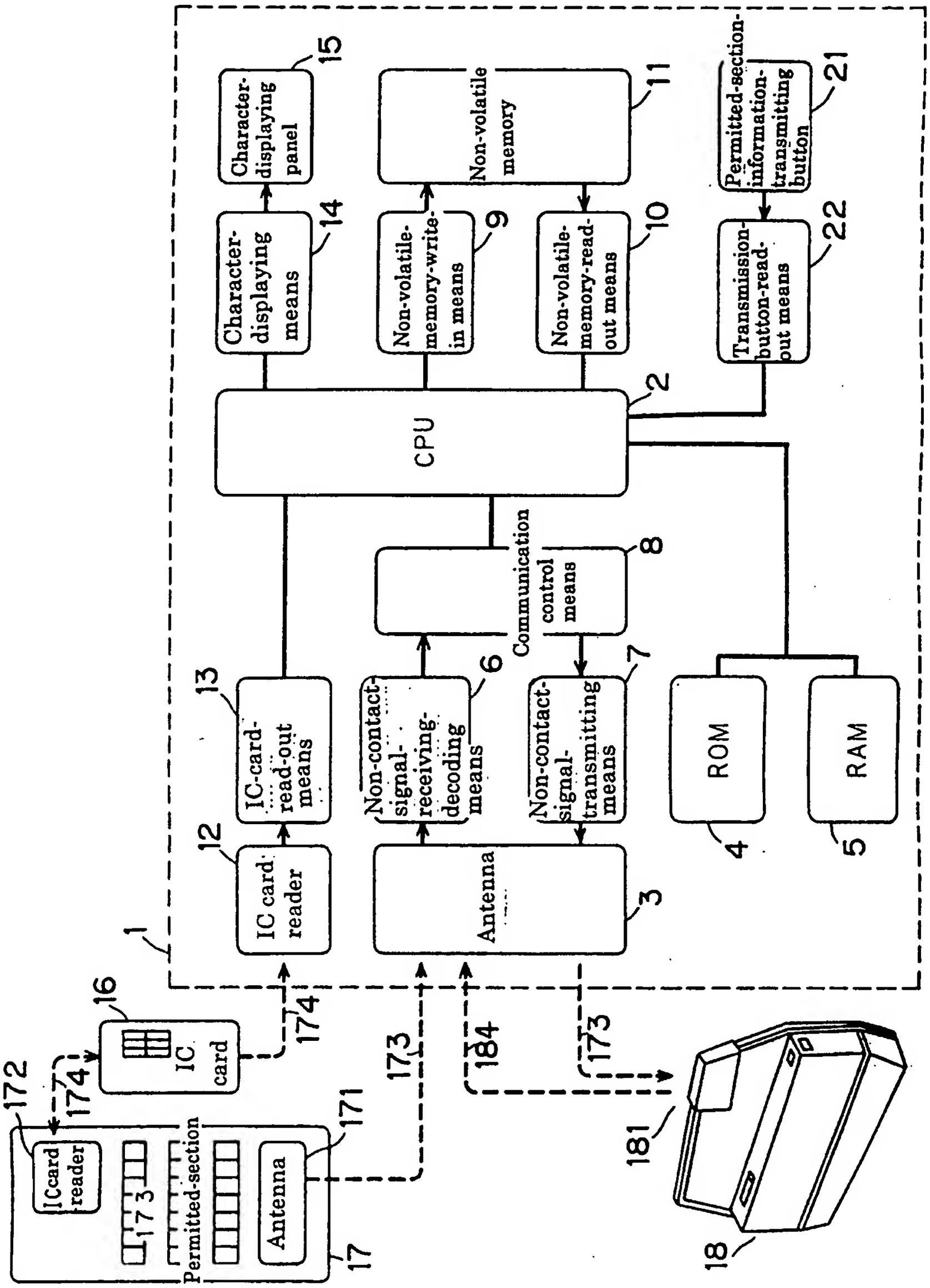
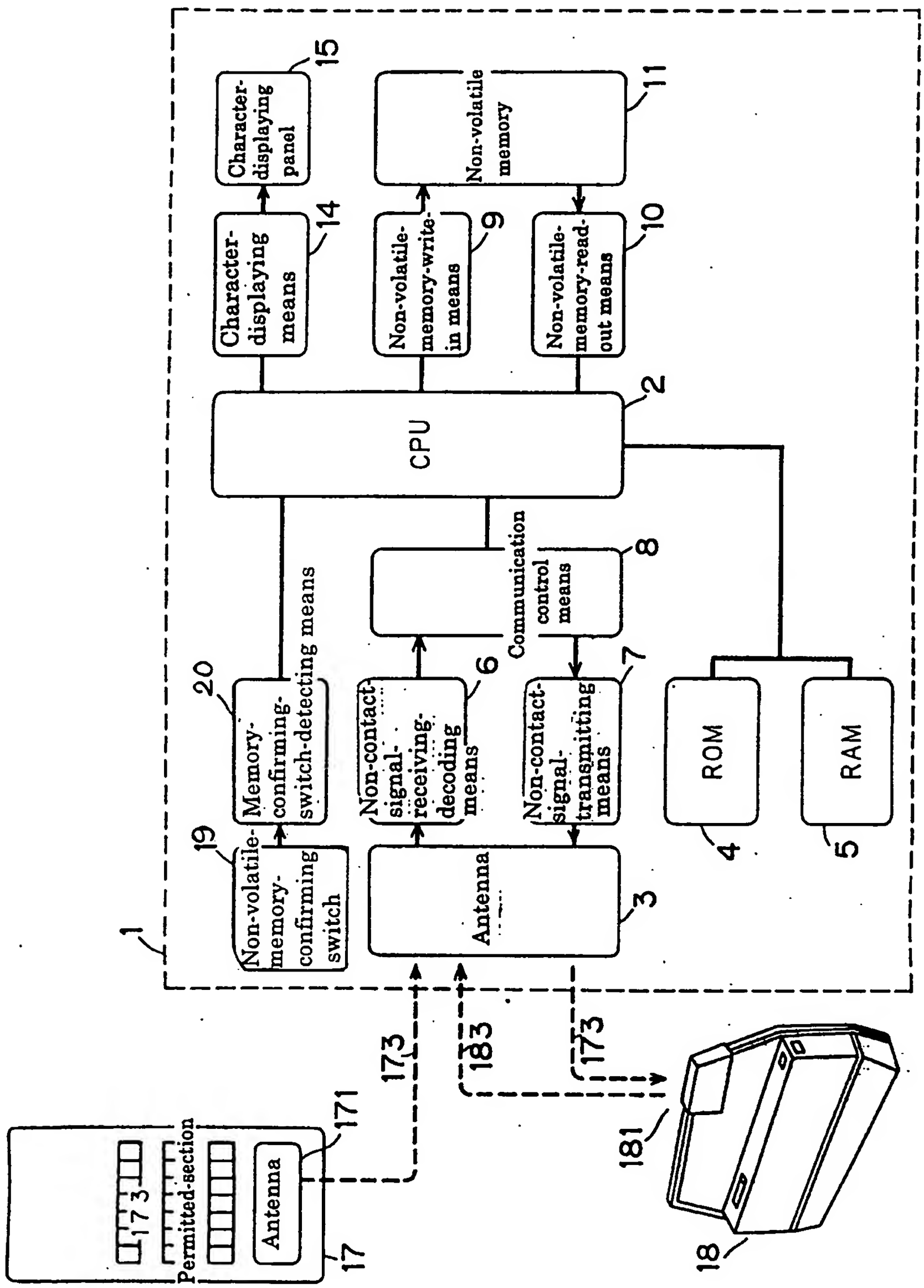

1
2
CPU
3
Antenna
4
ROM
5
RAM
6
Non-contact-signal-receiving-decoding means
7
Non-contact-signal-transmitting means
8
Communication control means
9
Non-volatile-memory-write-in means
10
Non-volatile-memory-read-out means
11
Non-volatile memory
12
IC card reader
13
IC-card-read-out means
14
Character-displaying means
15
Character-displaying panel
16
IC card
17
Permitted-section
171
Antenna
172
ICcard reader
173
174
18
181
21
Permitted-section-information-transmitting button
22
Transmission-button-read-out means
184

FIG. 3


Character-displaying panel
15
Non-volatile memory
11
Character-displaying means
14
Non-volatile-memory-write-in means
9
Non-volatile-memory-read-out means
10
CPU
2
Communication control means
8
Memory-confirming-switch-detecting means
20
Non-contact-signal-receiving-decoding means
6
Non-contact-signal-transmitting means
7
ROM
4
RAM
5
Non-volatile-memory-confirming switch
19
Antenna
3
1
173
183
173
181
18
171
Antenna
Permitted-section
17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP96/02462

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl^6 G07B15/00, G07B15/00, 501, G07F7/08, G06F15/21, 340

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int. Cl^6 G07B1/00-9/02, G07B11/00, 17/04, G07F5/00-9/10, 102, G06F15/20-15/20, 102, G06F15/21-15/21, 360, G06F15/24-15/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926 - 1996
Kokai Jitsuyo Shinan Koho 1971 - 1996
Toroku Jitsuyo Shinan Koho 1994 - 1996

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
JOIS, Automatic Checking and Collecting Machine, Ticket Machine, Terminal, Contactless

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 6-274709, A (The Nippon Signal Co., Ltd.), September 30, 1994 (30. 09. 94)(Family: none)	1 - 6
A	JP, 7-78225, A (The Nippon Signal Co., Ltd.), March 20, 1995 (20. 03. 95)(Family: none)	1 - 6

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
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Date of the actual completion of the international search	Date of mailing of the international search report
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